shall be located upstream of the point of introduction of dilution air into the duct. Sample ports may be located before or after the upturn elbow, in order to accommodate the configuration of the turning vanes and baffles and to permit a complete, unobstructed traverse of the stack. The sample ports shall not be located within 5 feet or 2 diameters (whichever is less) of the gas discharge to atmosphere. For supplementary-fired, combined-cycle plants, the sampling site shall be located between the gas turbine and the boiler. The diameter of the sample ports shall be sufficient to allow entry of the sample probe.

6.1.2 A preliminary O_2 or CO_2 traverse is made for the purpose of selecting sampling points of low O_2 or high CO_2 concentrations, as appropriate for the measurement system. Conduct this test at the turbine operating condition that is the lowest percentage of peak load operation included in the test program. Follow the procedure below, or use an alternative procedure subject to the approval of the Administrator.

6.1.2.1 Minimum Number of Points. Select a minimum number of points as follows: (1) Eight, for stacks having cross-sectional areas less than 1.5 m^2 (16.1 ft^2); (2) eight plus one additional sample point for each 0.2 m^2 (2.2 ft^2 of areas, for stacks of 1.5 m^2 to 10.0 m^2 (16.1–107.6 ft^2) in cross-sectional area; and (3) 49 sample points (48 for circular stacks) for stacks greater than 10.0 m^2 (107.6 ft^2) in cross-sectional area. Note that for circular ducts, the number of sample points must be a multiple of 4, and for rectangular ducts, the number of points must be one of those listed in Table 20–2; therefore, round off the number of points (upward), when appropriate.

6.1.2.2 Cross-sectional Layout and Location of Traverse Points. After the number of traverse points for the preliminary diluent sampling has been determined, use Method 1 to located the traverse points.

6.1.2.3 Preliminary Diluent Measurement. While the gas turbine is operating at the lowest percent of peak load, conduct a preliminary diluent measurement as follows: Position the probe at the first traverse point and begin sampling. The minimum sampling time at each point shall be 1 minute plus the average system response time. Determine the average steady-state concentration of diluent at each point and record the data on Figure 20–6.

6.1.2.4 Selection of Emission Test Sampling Points. Select the eight sampling points at which the lowest O_2 concentrations or highest CO_2 concentrations were obtained. Sample at each of these selected points during each run at the different turbine load conditions. More than eight points may be used, if desired, providing that the points selected as described above are included.

TABLE 20–2—CROSS-SECTIONAL LAYOUT FOR RECTANGULAR STACKS

	Matrix layout
No. of traverse points:	
9	3 x 3
12	4 x 3
16	4 x 4
20	5 x 4
25	5 x 5
30	6 x 5
36	6 x 6
42	7 x 6
49	7 x 7

FIGURE 20–6—PRELIMINARY DILUENT TRAVERSE

Date _____

Location:
Plant _____
City, State _____

Turbine identification:
Manufacturer _____
Model, serial number _____

Sample point	Diluent concentration, ppm

6.2 NO_x and Diluent Measurement. This test is to be conducted at each of the specified load conditions. Three test runs at each load condition constitute a complete test.

6.2.1 At the beginning of each NO_x test run and, as applicable, during the run, record turbine data as indicated in Figure 20–7. Also, record the location and number of the traverse points on a diagram.

6.2.2 Position the probe at the first point determined in the preceding section and begin sampling. The minimum sampling time at each point shall be at least 1 minute plus the average system response time. Determine the average steady-state concentration of diluent and NO_x at each point and record the data on Figure 20–8.

FIGURE 20–7—STATIONARY GAS TURBINE DATA

TURBINE OPERATION RECORD

Test operator _____ Date ____

Turbine identification:
Type _____
Serial No. _____

Location:
Plant _____
City _____

Ambient temperature _____
Ambient humidity _____
Test time start _____
Test time finish _____
Fuel flow rate[a] _____
Water or steam flow rate[a] _____
Ambient pressure _____

Ultimate fuel analysis:
C _____
H _____
O _____
N _____
S _____
Ash _____
H_20 _____

Trace metals:
Na _____
Va _____
K _____
etc[b] _____

Operating load _____

[a]Describe measurement method, i.e., continuous flow meter, start finish volumes, etc.

[b]i.e., additional elements added for smoke suppression.

FIGURE 20–8—STATIONARY GAS TURBINE SAMPLE POINT RECORD

Turbine identification:
Manufacturer _____
Model, serial No. _____

Location:
Plant _____
City, State _____

Ambient temperature _____
Ambient pressure _____
Date _____
Test time: start _____
Test time: finish _____
Test operator name _____

Diluent instrument type _____
Serial No _____

NO_x instrument type _____
Serial No. _____

Sample point	Time, min	Diluent[a], %	NO_x a, ppm

[a]Average steady-state value from recorder or instrument readout.

6.2.3 After sampling the last point, conclude the test run by recording the final turbine operating parameters and by determining the zero and calibration drift, as follows:

Immediately following the test run at each load condition, or if adjustments are necessary for the measurement system during the tests, reintroduce the zero and mid-level calibration gases as described in Sections 4.3 and 4.4, one at a time, to the measurement system at the calibration valve assembly. (Make no adjustments to the measurement system until after the drift checks are made). Record the analyzers' responses on a form similar to Figure 20–3. If the drift values exceed the specified limits, the test run preceding the check is considered invalid and will be repeated following corrections to the measurement system. Alternatively, recalibrate the measurement system and recalculate the measurement data. Report the test results based on both the initial calibration and the recalibration data.

6.3 SO_2 Measurement. This test is conducted only at the 100 percent peak load condition. Determine SO_2 using Method 6, or equivalent, during the test. Select a minimum of six total points from those required for the NO_x measurements; use two points for each sample run. The sample time at each point shall be at least 10 minutes. Average the diluent readings taken during the NO_x test runs at sample points corresponding to the SO_2 traverse points (see Section 6.2.2) and use this average diluent concentration to correct the integrated SO_2 concentration obtained by Method 6 to 15 percent diluent (see Equation 20–1).

If the applicable regulation allows fuel sampling and analysis for fuel sulfur content to demonstrate compliance with sulfur emission unit, emission sampling with Method 6 is not required, provided the fuel sulfur content meets the limits of the regulation.

7. *Emission Calculations*

7.1 Moisture Correction. Measurement data used in most of these calculations must be on a dry basis. If measurements must be corrected to dry conditions, use the following equation:

$$C_d = \frac{C_w}{1 - B_{ws}} \qquad \text{Eq. 20-1}$$

where:

C_d=Pollutant or diluent concentration adjusted to dry conditions, ppm or percent.

C_w=Pollutant or diluent concentration measured under moist sample conditions, ppm or percent.

B_{ws}=Moisture content of sample gas as measured with Method 4, reference method, or other approved method, percent/100.

7.2 CO_2 Correction Factor. If pollutant concentrations are to be corrected to 15 percent O_2 and CO_2 concentration is measured in lieu of O_2 concentration measurement, a CO_2 correction factor is needed. Calculate the CO_2 correction factor as follows:

7.2.1 Calculate the fuel-specific F_0 value for the fuel burned during the test using values obtained from Method 19, Section 5.2, and the following equation.